

IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF GEORGIA  
ATLANTA DIVISION

\_\_\_\_\_  
DONNA CURLING, ET AL., )  
Plaintiffs, ) CIVIL ACTION FILE  
vs. ) NO. 1:17-CV-2989-AT  
BRAD RAFFENSPERGER, ET AL., )  
Defendants. )  
\_\_\_\_\_)

VIDEOTAPED DEPOSITION OF  
MICHAEL IAN SHAMOS, PH.D., J.D.

July 19, 2019

9:16 a.m.

Ross Alloy Belinfante Littlefield, LLC  
500 14th Street N.W.  
Atlanta, Georgia

Robin K. Ferrill, CCR-B-1936, RPR

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(Original exhibits attached to the Original transcript.)

VIDEOTAPED DEPOSITION OF

MICHAEL IAN SHAMOS, PH.D., J.D.

July 19, 2019

(Plaintiffs' Exhibit 73, Declaration of  
Michael Shamos, Ph.D., J.D., marked for  
identification.)

THE VIDEOGRAPHER: We are on the record and  
the time is 9:16 a.m. Today is July 19th, 2019.  
And this is the video deposition for Dr. Michael  
Shamos.

Will counsel please identify themselves and  
who they represent.

MR. CROSS: David Cross of Morrison &  
Foerster on behalf of the Curling plaintiffs.  
And with me is my colleague, Catherine Chapple.

JOHN POWERS: John Powers, the Lawyers  
Committee For Civil Rights Under Law  
representing the Coalition plaintiffs.

MR. SPARKS: Adam Sparks and Halsey Knapp,  
for Krevolin & Horst, also representing the  
Curling plaintiffs.

MS. RINGER: Cheryl Ringer representing  
Fulton County defendants.

MR. RUSSO: Vincent Russo and Carey Miller  
with the Robbins firm representing the State

1 defendants.

2 THE VIDEOGRAPHER: Thank you, Counsel.

3 Will the court reporter please swear in the  
4 witness.

5 MICHAEL IAN SHAMOS, Ph.D., J.D.,

6 called as a witness, having been duly sworn  
7 by a Notary Public, was examined and testified as  
8 follows:

9 MR. CROSS: We probably should just note  
10 for the record that Ms. Marks is here, too; I  
11 don't think there is an appearance here. And  
12 Dr. Halderman, as well.

13 MR. RUSSO: And, David, before we start, we  
14 want to make sure our objection to the  
15 deposition notice is on the record.

16 The deposition was noticed as a de bene  
17 esse deposition, but it indicates that questions  
18 would be regarding all the claims and defenses  
19 in the case. So to the extent that the  
20 deposition is outside the scope of Dr. Shamos'  
21 declaration, which is his direct testimony for  
22 purposes of this, we do object to that.

23 MR. CROSS: So you are saying I couldn't  
24 cross-examine him live at a hearing on any issue  
25 relevant to the claims or defenses in the case?

1 particular ballot won't indicate to that voter  
2 whether the actual tabulation of that ballot is  
3 accurate, right?

4 A. I think the voter can be assured that if  
5 their -- if nobody -- after he cast the ballot has  
6 tampered with the ballot, if there is a hand recount,  
7 it will be counted accurately.

8 Q. That assumes that the election results  
9 require a hand recount, which doesn't often happen,  
10 right?

11 A. I agree. I said, "if there is a hand  
12 recount."

13 Q. All right. So we understand with a  
14 ballot-marking device that produces a paper ballot  
15 that includes a non-human-readable portion that's  
16 going to be used to tabulate that ballot --

17 A. Yes.

18 Q. -- we agreed that apart from a hand  
19 recount, no matter how carefully that voter reviews  
20 that ballot, they have no way of knowing whether that  
21 tabulation is going to be accurate.

22 A. No, that's not true. I'll say, first, I'm  
23 not a fan of bar codes; however, as I say, you can  
24 always test the machine in realtime to see if it is  
25 producing an accurate bar code.

1 Q. Well, the voter can't?

2 A. The voter can't, no.

3 Q. So the voter cannot have the confidence

4 I've just --

5 A. The voter can have the confidence if there  
6 are people at the election center -- at the polling  
7 place who are doing the testing and certify that the  
8 machine is working.

9 Q. Which, to your scenario before, assumes  
10 there's not an insider that's manipulated that in  
11 some way, right?

12 A. Yes. All voting systems have risks.

13 Q. But you agree -- you said you are not a fan  
14 of the bar codes. You agree that if a BMD is going  
15 to be used, the more reliable approach is one that is  
16 readable by the human voter, and that what's going to  
17 get tallied is what they can actually read  
18 themselves; is that fair?

19 MR. RUSSO: Objection. This is outside the  
20 scope of his declaration.

21 A. Yes, I agree.

22 Q. (By Mr. Cross) Thank you.

23 On paragraph 52, again, the last sentence  
24 reads, "A BMD never makes a mark that would not  
25 constitute a vote." Do you see that?

1 something different than air grabbed?

2 A. The terms are not related. I mean, an  
3 Internet-facing system is not air gapped. There are  
4 air-gapped systems that have nothing to do with the  
5 Internet either way. Yes.

6 Q. Thank you. Let me try it this way: Is an  
7 air-gapped system something more than a system that's  
8 not interfacing -- Internet facing?

9 A. Yes, so I can have a system that -- let's  
10 just forget about the Internet completely. I have  
11 different components of a system, I have some in this  
12 room and I have some in that room. If it is not  
13 possible for one computer to communicate with another  
14 computer except by the physical moving of media from  
15 one to other, they are air gapped. It doesn't  
16 directly relate to the Internet. But, of course, if  
17 I can get to your system through the Internet, it's  
18 not air gapped.

19 Q. So you say except for removal of media --  
20 so you would consider a system where removal of media  
21 is sometimes connected to an Internet-facing  
22 computer, and it's also connected to that standalone  
23 system, would you still consider that system air  
24 gapped?

25 A. No. The systems is in use for election



1 management should never, at any point in their life,  
2 have ever been -- ever be connected to the Internet.

3 Q. Including by removable of media that at  
4 some point was connected to an Internet-facing  
5 computer, for example?

6 A. That's right.

7 Q. Why is that?

8 A. Because of the possibility of infections  
9 from malware.

10 Q. What if you had a server that was connected  
11 to phone lines, say, by a modem, is that air gapped?

12 A. So air gapped refers to a gap between two  
13 things. So if it's connectable by a phone line to  
14 something else, it's not air gapped from that thing.  
15 It's copper-connected.

16 Q. Would it be Internet facing?

17 A. Not necessarily.

18 Q. It would depend on the connection. A  
19 connection with the phone lines via modem and a  
20 server could be Internet facing and it might not be.

21 A. Usually aren't. I mean, in the United  
22 States, there are jurisdictions that transmit vote  
23 totals via modem to a central count station. It's  
24 not over the Internet; it's over a direct phone line  
25 connection.

1 MR. RUSSO: Objection --

2 A. No, I haven't, and I doubt that anybody  
3 could. So we are talking about a complete history of  
4 a voting machine from its birth. I don't think  
5 anybody has an audit trail of that.

6 Q. (By Mr. Cross) And you haven't undertaken  
7 that analysis to determine whether it's true, even  
8 today, for those?

9 A. No.

10 Q. And that's not something you discussed with  
11 anyone at the State for your opinions, right?

12 MR. RUSSO: Objection.

13 A. No.

14 Q. (By Mr. Cross) All right. Flip to  
15 paragraph 95. Do you see the sentence beginning  
16 about the third line from the bottom of paragraph, it  
17 reads, "And time is a luxury the hacker does not have  
18 because he cannot be alone with a voting machine, as  
19 Dr. Halderman is in his laboratory, for any length of  
20 time." Do you see that?

21 A. Yes.

22 Q. But a hacker could cause problems with a  
23 DRE being alone with it for a matter of minutes, half  
24 an hour, maybe less, right?

25 A. Yes, one DRE machine.

1 Q. And they could do the same with a single  
2 memory card, right, access to a single memory card --

3 A. Yes.

4 Q. -- in a half an hour?

5 A. Yes, they'd have to have access to the  
6 machine.

7 Q. The memory card?

8 A. Oh, well, but the memory card ultimately  
9 then has to be inserted in a machine.

10 Q. But they could manipulate the memory card  
11 in a matter of minutes if they had access to it,  
12 right?

13 A. Yes.

14 Q. All right. Flip back to paragraph 72. At  
15 the end of this paragraph you write, "Further, once  
16 installed, the malware is detectable because it  
17 differs from the legitimate software."

18 A. Yes.

19 Q. "Simply by dumping the contents of a  
20 machine's memory, one could detect the difference  
21 during an audit." Do you see that?

22 A. Yes.

23 Q. Where in your declaration do you describe  
24 or discuss any analysis that you have performed on  
25 memory cards that have vote-stealing malware to

1 of his opinion.

2 MR. CROSS: Are you seriously saying he's  
3 not offering an opinion on parallel testing in  
4 this case?

5 MR. RUSSO: He didn't review Georgia's  
6 parallel testing procedures.

7 MR. CROSS: Okay. So will you stipulate  
8 that he's not offering any opinion that the  
9 parallel testing in this case offers any  
10 reliability or is relevant in any way?

11 MR. RUSSO: No.

12 MR. CROSS: Great. Than we are going to  
13 continue with our questioning.

14 THE WITNESS: I don't mind. I'm given to  
15 understand that the process you outlined is  
16 what -- is the process followed in Georgia. I  
17 castigate Georgia for not following my  
18 recommendations on how parallel testing should  
19 be done.

20 Q. (By Mr. Cross) And you would agree that  
21 nothing can be reliably concluded about the  
22 reliability of DREs across the state, the 27,000 DREs  
23 in the state-wide election, or even across county or  
24 municipal elections, based on parallel testing of a  
25 single DRE. We agree on that, right?

1           A.    The only thing a parallel testing on a  
2   single DRE will reveal is whether all of the voting  
3   machines in the state have been infected, because  
4   then the machine being tested would also have been  
5   infected.

6           Q.    Right.   The only way you could have any  
7   confidence that the machine you have indicates  
8   anything about the reliability of the 27,000, is if  
9   all 27,000 are affected?

10          A.    Yes, I don't have confidence in a procedure  
11   which selects one machine out of 27,000.

12          Q.    Let's say that only a hundred out of 27,000  
13   DREs were infected by malware.   Okay?   And you are  
14   using the system, as we understand it in Georgia, of  
15   one machine, that would mean that you would have a  
16   statistical probability of finding one of those  
17   hundred only one out of 270 times, does that sound  
18   about right?

19               MR. RUSSO:   Objection.

20          A.    That sounds quite right.

21          Q.    (By Mr. Cross) Which would mean that if you  
22   did 270 of these tests, you would find an infected  
23   machine statistically only once?

24          A.    On average, yes.   I'm not defending the  
25   process.

1 Q. Do you agree with me, then, that the DRE  
2 voting system currently being used in Georgia is also  
3 not completely secure?

4 A. Of course. Since none are, it isn't.

5 Q. Now, let's consider a situation where --  
6 and this is a hypothetical situation -- where some  
7 vulnerabilities are found in an electronic voting  
8 system. What vulnerabilities theoretically could be  
9 found in an electronic voting system?

10 A. Well, I think the experts in this case and  
11 the outside security companies that were hired did a  
12 pretty good job of cataloging what the  
13 vulnerabilities are.

14 Q. Are you aware of any?

15 A. I'm aware of all of those.

16 Q. And what are they?

17 A. There's a mountain of them. Okay. Because  
18 the system consists of a huge number of pieces. The  
19 pieces are geographically distributed. Things have  
20 to be moved from one place to another by who knows  
21 what mechanism. Computers are involved that can be  
22 penetrated. Hardware is involved that can be  
23 penetrated. Memory cards can be penetrated. You  
24 draw a diagram surrounding every block in the  
25 diagram, there's going to be some kind of threat that

1 could be mounted against that block in the diagram.

2 Q. Is there any point, in your professional  
3 estimation, that an electronic voting system could be  
4 so vulnerable with respect to security that you would  
5 not recommend using them in elections?

6 A. Many times. I think I recommended not  
7 certifying about half of the systems I examine.

8 Q. And what were those systems?

9 A. Well, I don't remember them now. I haven't  
10 done a certification exam since 20 years, but there  
11 are plenty.

12 Q. If there was a high degree of likelihood  
13 that advanced persistent threats could infiltrate an  
14 election system, would you recommend that election  
15 system be replaced?

16 A. Okay. Let's distinguish between election  
17 system and tabulation system. Okay. So you phrased  
18 it as election system. If election system includes  
19 Internet-facing components, then advanced persistent  
20 threats are a significant possibility, not if it's  
21 not Internet facing. And so the tabulation systems  
22 are not Internet facing, shouldn't be, and so I  
23 wouldn't consider APT as a serious threat to those.  
24 But, for example, the registration system that's  
25 Internet facing, who knows what's going on there.

C E R T I F I C A T E

STATE OF GEORGIA )

) ss.:

FULTON COUNTY )

I, Robin Ferrill, Certified Court Reporter  
within the State of Georgia, do hereby certify:

That MICHAEL IAN SHAMOS, Ph.D., J.D., the  
witness whose deposition is hereinbefore set forth,  
was duly sworn by me and that such deposition is a  
true record of the testimony given by such witness.

I further certify that I am not related to  
any of the parties to this action by blood or  
marriage; and that I am in no way interested in the  
outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set  
my hand this 20th day of July, 2019.



ROBIN K. FERRILL, RPR